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Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

94-RPS-149

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Mr. J. McCormick, Director
Air and Toxics Division
U.S. Environmental Protection Agency
Region 10
Mail Stop AT-082
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. McCormick:

APPLICATION FOR APPROVAL FOR CONSTRUCTION PURSUANT TO 40 CODE OF FEDERAL REGULATIONS 61 FOR VENTILATION UPGRADES, 241-AY AND 241-AZ TANK FARMS

Enclosed please find an application for approval to construct Ventilation Upgrades, 241-AY and 241-AZ Tank Farms. The application has been prepared pursuant to 40 Code of Federal Regulations 61 Subpart H.

The application includes two projects: Project W-151 and Project W-030. Project W-151, 101-AZ Retrieval System, will add two 300 horsepower mixer pumps to Tank 241-AZ-101, to demonstrate retrieval methods. Project W-030, Tank Farm Ventilation Upgrade, will modify the existing ventilation system currently in use in the 241-AY and 241-AZ Tank Farms. The combined impact of the two projects results in a decreased potential dose to the public when compared to the existing system.

Should you have any questions, please contact me or Mr. S. D. Stites of my staff on (509) 376-8566.

Sincerely,

James D. Bauer, Program Manager
Office of Environmental Assurance,
Permits, and Policy

EAP:SDS

Enclosure:
NESHAPs Application, Ventilation
Upgrades

cc w/encl:
Administrative Records
J. Kalia, WHC
J. Luke, WHC

NATIONAL EMISSION STANDARD FOR HAZARDOUS AIR POLLUTANTS APPLICATION FOR APPROVAL TO CONSTRUCT VENTILATION UPGRADES, 241-AY AND 241-AZ TANK FARMS

1.0 Proposed Nature of the Source

Tank Farms 241-AY and 241-AZ are located at adjacent sites in the 200 East Area of the Hanford Site. Each tank farm contains two tanks, and a single system ventilates all four tanks. Two projects that have the potential to alter air emissions from these farms are currently in the design phase. Project W-151, 101-AZ Retrieval System, will add two 300 horsepower mixer pumps to Tank 241-AZ-101, to demonstrate retrieval methods. Project W-030, Tank Farm Ventilation Upgrade, will modify the existing ventilation system currently in use in these tank farms.

The modifications proposed under Project W-030 will NOT result in an increase in air emissions, and the project would be proposed even if Project W-151 were not proposed. However, because of the increased ventilation requirements due to Project W-151, Project W-030 is being designed to meet the additional requirements. Due to the additional heat load of the mixer pumps, and the agitation of the waste by the pumps, emissions will potentially increase due to Project W-151. When both projects are complete, the potential dose to the public will be less than from the existing system.

2.0 Proposed Size of the Source

When the mixer pumps in Tank 241-AZ-101 are not operated, approximately 100 standard cubic feet per minute (scfm) will be split from each tank and combined together (for a total of 400 scfm), which will be discharged to the atmosphere. When the mixer pumps are operated, approximately 500 scfm will be drawn from 241-AZ-101, and combined with 100 scfm from the other three tanks, for a total of 800 scfm.

3.0 Proposed Design of the Source

Project W-030 will install two systems that will affect emissions: a recirculating coolant system and a ventilation system. The recirculating coolant system is considered a portion of the process and not a part of the emission control system. Each tank will have a separate recirculating coolant system, as shown in Figure 1, which will consist of a recirculation condenser and a moisture separator and will operate at approximately 500 scfm. Approximately 100 scfm will be split from this stream, prior to recirculation to the tanks, and combined with 100 scfm from each of the other tanks. The combined 400 scfm will be discharged to the atmosphere, after treatment. When the mixer pumps are operated, the 500 scfm being drawn from 241-AZ-101 will not be recirculated. It will be combined with the 100 scfm from each of the other three tanks for a total discharge of 800 scfm. The remaining flow from the other three tanks will continue to be recirculated back to the tanks.

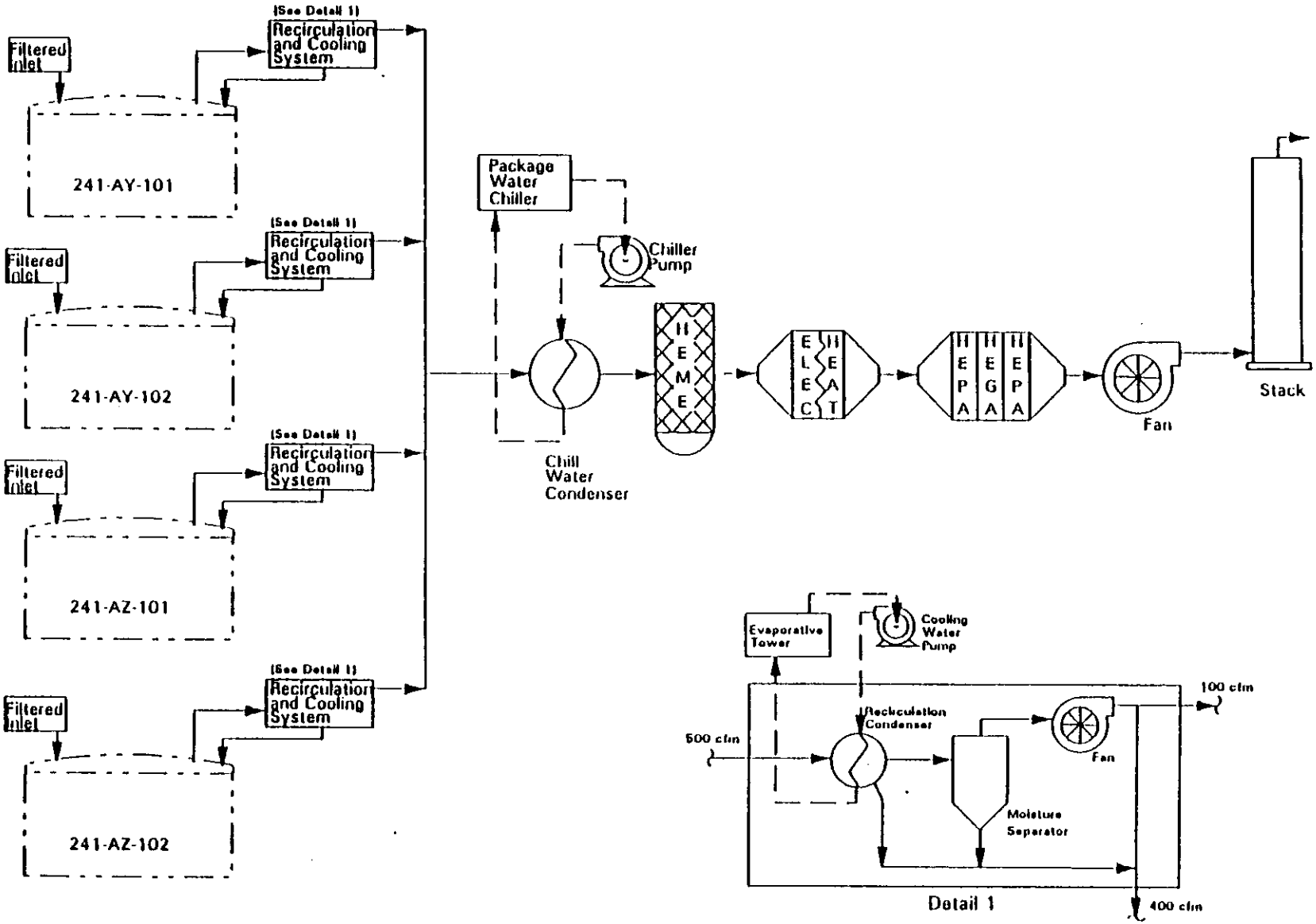

Figure 1: System Layout

The portion of the stream that is to be discharged to the atmosphere (400 scfm or 800 scfm) will flow through an emissions control system consisting of a condenser, high efficiency mist eliminator (HEME), heater, and two high efficiency particulate air (HEPA) filters with a high efficiency gas adsorption unit between the HEPAs (Figure 1). A fan and stack complete the ventilation system. Unabated emissions are the emissions prior to this emission control system. The stack will be 55 feet high with a 24 inch diameter duct for the bottom 47 feet of the stack, ten inch diameter duct for the remaining eight feet, to increase the exit velocity.

The existing ventilation system consists of a condenser, moisture deentrainer, and two HEPA filters. Project W-030 will add the recirculating coolant system and the high efficiency gas adsorption unit which will result in decreased emissions from the 241-AY and 241-AZ Tank Farms.

4.0 Operating Design Capacity

The ventilation system will be designed to exhaust all four tanks in the two tank farms while the mixer pumps are operated in Tank 241-AZ-101. The storage capacity of the tanks will not be altered due to Projects W-030 or W-151.

5.0 Method of Operation

The ventilation system will be operated 24 hours a day, 365 days a year. During fiscal year 1997, the mixer pumps in Tank 241-AZ-101 will operate 800 mixer pump hours (one hour with one mixer operating) to determine the effectiveness of the mixer pumps for waste retrieval purposes and an additional 336 mixer pump hours over one week for the first wash. During fiscal year 1998, 336 mixer pump hours over one week will be required for the second wash. For retrieval (currently scheduled for fiscal year 1999), 636 mixer pump hours will be required over two weeks. These durations and estimated dates of occurrence are approximate.

The ventilation system will be equipped with sampling equipment designed and operated in accordance with 40 Code of Federal Regulations (CFR) 61, Subpart H, and all referenced requirements. Among other design criteria, sample probes will be designed to obtain representative samples, the location will be selected in accordance with referenced standards, and sample line length and bends will be minimized. The sampler for particulates, iodine, and tritium will operate continuously and will be calibrated and audited in accordance with procedures currently used in tank farms. Additionally, for operational purposes, the stack will contain a monitor for beta and gamma radiation.

6.0 Emissions Control System

The efficiency of each piece of control equipment shown in Figure 1 and listed in Section 3.0 is included in Table 1.

Table 1: Control Equipment Effectiveness

Equipment	Decontamination Factor	Removal Efficiency	Contaminate
Condenser	5	80 percent	Soluble particulates
	3	66.7 percent	Insoluble particulates
	2	50 percent	Tritiated water
HEME	15	93.3 percent	Soluble and insoluble particulates
	4	75 percent	Tritiated water
gas adsorber (HEGA)	50	98 percent	Radioactive Iodine vapor
	2	50 percent	Other radioactive gases
HEPA filters (2)	3,000,000	99.99997 percent	Particulates

6.1 Emissions Release Rates

A source term was developed based on existing knowledge of the tank vapor space contents, accounting for emissions both with and without the operation of the mixer pumps in Tank 241-AZ-101. This information is included as Appendix A of the Supplemental Design Requirements Document for Project W-030 (WHC 1992), and repeated in Table 2. Based on this information, annual unabated emissions have been estimated both with and without the mixer pumps operational in Tank 241-AZ-101. The ventilation rate is 400 scfm when the mixer pumps are not in operation, and 800 scfm when they are operated.

Table 2: Unabated Emissions

Radionuclide	Without Mixer Pumps Running		With Mixer Pumps Running	
	$\mu Ci/ft^3$	Ci/yr	$\mu Ci/ft^3$	Ci/yr
H-3	7.0E-01	1.5E+02	8.8E-01	3.7E+02
Sr-90	5.6E+01	1.2E+04	2.8E+01	1.2E+04
Y-90	5.6E+01	1.2E+04	2.8E+01	1.2E+04
Ru-106	6.9E-08	1.4E-05	3.5E-08	1.5E-05
Rh-106	6.9E-08	1.4E-05	3.5E-08	1.4E-05
Sn-113	1.3E-07	2.6E-05	6.3E-08	2.6E-05
Sb-125	6.2E-07	1.3E-04	3.1E-07	1.3E-04
I-129	3.9E-05	8.4E-03	1.9E-05	8.0E-03
Cs-137	1.9E+00	3.9E+02	9.5E-01	3.9E+02
Ba-137m	1.8E+00	3.7E+02	9.4E-01	3.7E+02
Pu-239	2.7E-03	5.6E-01	1.4E-03	5.9E-01
Pu-240	2.7E-03	5.4E-01	1.4E-03	6.0E-01

Based on the efficiencies and decontamination factors shown in Table 1, controlled emissions can be determined both with and without the mixer pumps operational, and are shown in Tables 3 and 4, respectively.

Table 3: Abated Emissions Without Mixer Pumps Running

Radionuclide	Unabated	After Condenser	After HEME	Abated Emissions	
	Ci/min	Ci/min	Ci/min	Ci/min	Ci/yr
H-3	2.8E-04	7.0E-05	3.4E-05	3.4E-05	1.8E+01
Sr-90	2.3E-02	7.6E-03	5.0E-04	1.7E-10	8.9E-05
Y-90	2.2E-02	7.4E-03	4.9E-04	1.7E-10	8.7E-05
Ru-106	2.7E-11	2.7E-11	2.7E-11	1.4E-11	7.3E-06
Rh-106	2.7E-11	2.7E-11	2.7E-11	1.5E-11	7.2E-06
Sn-113	5.0E-11	5.0E-11	5.0E-11	2.6E-11	1.4E-05
Sb-125	2.5E-10	2.5E-10	2.5E-10	1.2E-10	6.4E-05
I-129	1.6E-08	1.6E-08	1.6E-08	3.2E-10	1.6E-04
Cs-137	7.5E-04	1.5E-04	1.0E-05	3.4E-12	1.8E-06
Ba-137m	7.1E-04	1.4E-04	9.5E-06	3.2E-12	1.7E-06
Pu-239	1.1E-06	3.7E-07	2.4E-08	7.9E-15	4.1E-09
Pu-240	1.0E-06	3.6E-07	2.4E-08	7.9E-15	4.2E-09

Table 4: Abated Emissions With Mixer Pumps Running

Radionuclide	Unabated	After Condenser	After HEME	Abated Emissions	
	Ci/min	Ci/min	Ci/min	Ci/min	Ci/yr
H-3	7.0E-04	1.8E-04	8.3E-05	8.3E-05	4.4E+01
Sr-90	2.3E-02	7.6E-03	5.0E-04	1.7E-10	8.9E-05
Y-90	2.2E-02	7.4E-03	4.9E-04	1.7E-10	8.7E-05
Ru-106	2.9E-11	2.9E-11	2.9E-11	1.4E-11	7.4E-06
Rh-106	2.7E-11	2.7E-11	2.7E-11	1.4E-11	7.3E-06
Sn-113	5.0E-11	5.0E-11	5.0E-11	2.5E-11	1.3E-05
Sb-125	2.5E-10	2.5E-10	2.5E-10	1.2E-10	6.4E-05
I-129	1.5E-08	1.5E-08	1.5E-08	3.1E-10	1.6E-04
Cs-137	7.5E-04	1.5E-04	1.0E-05	3.4E-12	1.8E-06
Ba-137m	7.1E-04	1.4E-04	7.3E-06	3.2E-12	1.7E-06
Pu-239	1.1E-06	3.7E-07	2.5E-08	8.2E-15	4.3E-09
Pu-240	1.1E-06	3.7E-07	2.5E-08	8.2E-15	4.3E-09

6.2 Offsite Doses

Table 5 contains the dose to the maximally exposed offsite individual from the emissions included in Tables 3 and 4. The unit dose factors were previously developed and provided to the regulatory agency (WHC 1991).

Table 5: Abated Emissions and Dose

Radionuclide	Unit Dose Factor	Without Mixer Pumps Running		With Mixer Pumps Running	
	mrem/Ci	Ci/yr	mrem/yr	Ci/yr	mrem/yr
H-3	2.2E-05	1.8E+01	3.9E-04	4.4E+01	9.6E-04
Sr-90	4.4E-02	8.9E-05	3.9E-06	8.9E-05	3.9E-06
Y-90	3.8E-04	8.7E-05	3.3E-08	8.7E-05	3.3E-08
Ru-106[1]	2.1E-02	7.3E-06	1.5E-07	7.4E-06	1.6E-07
Rh-106		7.2E-06		7.3E-06	
Sn-113	1.2E-03	1.4E-05	1.6E-08	1.3E-05	1.6E-08
Sb-125	4.2E-03	6.4E-05	2.6E-07	6.4E-05	2.6E-07
I-129	2.9E-01	1.6E-04	4.7E-05	1.6E-04	4.7E-05
Cs-137[1]	2.4E-02	1.8E-06	4.2E-08	1.8E-06	4.2E-08
Ba-137m		1.7E-06		1.7E-06	
Pu-239	8.7E+00	4.1E-09	3.6E-08	4.3E-09	3.7E-08
Pu-240	8.7E+00	4.2E-09	3.6E-08	4.3E-09	3.7E-08
Total Dose			4.4E-04		1.0E-03

Note 1: Dose includes daughter product

The operation of the mixer pumps more than doubles the emissions, however total emissions are still well below the ten mrem/year Standard. As shown, the majority of the increased dose is due to tritium. The dose resulting from all Hanford Site operations in 1992, was calculated at 0.004 mrem/yr (PNL 1993) for an individual located at Ringold. The maximally exposed individual for the 200 East Area is located 16 km East of 200 East. For 1992 emissions from the existing ventilation system, emissions resulted in a dose of 0.0015 mrem/yr to the individual located 16 km East of 200 East. The emissions as a result of a full year's operation of the mixer pump in Tank 241-AZ-101, in conjunction with previous operations at the Hanford Site, will not result in a violation of the National Emission Standard of 10 mrem/yr (40 CFR 61).

7.0 References

PNL 1993, *Hanford Site Environmental Report for Calendar Year 1992*, PNL 8682, Pacific Northwest Laboratory, Richland, Washington.

WHC, 1991, *Unit Dose Calculation Methods and Summary of Facility Effluent Monitoring Plan Determinations*, WHC-EP-0498, Westinghouse Hanford Company, Richland, Washington.

WHC, 1992, *Supplemental Definition of Requirements, Project W-030, Tank Farm Ventilation Upgrades*, WHC-SD-W030-RD-001, Westinghouse Hanford Company, Richland, Washington.

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants (NESHAP)" *Code of Federal Regulations*, as amended.

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